

the lowest, 44° 3, occurred at Duluth, Minnesota. The largest monthly ranges of water temperature are: 24° at Provincetown, Massachusetts; 21° 8 at Duluth, Minnesota; 15° 8 at Milwaukee, Wisconsin, and 14° 3 at Cedar Keys, Florida. The smallest monthly ranges are: 1° 4 at Pensacola, Florida; 2° 2 at San Francisco, California; 2° 9 at Portland, Oregon, and 3° 5 at Grand Haven, Michigan.

Temperature of Water for August, 1883.

STATION.	Temperature at bottom.		Range.	Average depth, feet and inches.		Mean temperature of the air at station.
	Max.	Min.				
Atlantic City, New Jersey.....	69.4	61.4	8.0	ft. in.		70.5
Alpena, Michigan.....	68.7	62.7	6.0	12 1		61.7
Augusta, Georgia.....	90.0	80.0	10.0	5 0		76.9
Baltimore, Maryland.....	79.5	75.0	4.5	9 11		72.9
Block Island, Rhode Island.....	67.5	63.5	4.0	8 8		67.2
Boston, Massachusetts.....	65.7	59.4	6.3	21 4		67.6
Buffalo, New York.....	72.9	68.2	4.7	10 7		65.8
Cedar Keys, Florida.....	82.2	77.9	4.3	11 0		83.7
Charleston, South Carolina.....	86.1	80.1	6.0	40 8		79.9
Chicago, Illinois.....	70.7	64.2	6.5	8 5		68.3
Chincoteague, Virginia.....	82.5	71.0	11.5	5 6		72.3
Cleveland, Ohio.....	76.1	68.0	8.1	14 0		66.9
Detroit, Michigan.....	73.0	68.0	5.0	23 1		67.7
Delaware Breakwater, Delaware.....	75.0	66.8	8.2	9 8		71.7
Duluth, Minnesota.....	66.1	44.3	21.8	14 7		62.8
Eastport, Maine.....	50.7	46.3	4.4	15 8		62.2
Esacnaba, Michigan.....	64.8	55.0	9.8	15 0		61.9
Fort Macon, North Carolina.....	85.0	71.5	13.5	8 1		77.4
Galveston, Texas.....	86.0	82.0	4.0	12 0		84.6
Grand Haven, Michigan.....	73.3	60.8	12.5	19 0		64.5
Indianola, Texas.....	88.5	85.5	3.0	7 11		83.6
Jacksonville, Florida.....	88.5	83.0	5.5	16 0		80.8
Key West, Florida.....	89.7	85.2	4.5	17 3		83.7
Mackinaw City, Michigan.....	66.8	61.0	5.8	12 0		62.0
Marquette, Michigan.....	60.0	54.0	6.0	9 10		61.9
Milwaukee, Wisconsin.....	69.9	54.1	15.8	8 0		65.9
Mobile, Alabama.....	89.6	84.0	5.6	16 5		82.0
New Haven, Connecticut.....	77.5	69.2	8.3	15 4		67.3
New London, Connecticut.....	70.0	66.0	4.0	12 7		67.9
New York City.....	73.1	68.6	4.5	17 0		70.8
Norfolk, Virginia.....	81.5	75.6	5.9	16 0		76.2
Pensacola, Florida.....	85.7	83.3	2.4	17 3		81.0
Portland, Maine.....	63.0	56.5	6.5	28 10		67.9
Portland, Oregon.....	65.3	62.4	2.9	57 2		62.7
Provincetown, Massachusetts.....	71.5	47.5	24.0	12 0		68.0
Sandusky, Ohio.....	74.0	70.0	4.0	10 7		69.4
Sandy Hook, New Jersey.....	72.5	69.7	2.8	1 6		72.2
San Francisco, California.....	60.8	58.6	2.2	30 1		57.9
Savannah, Georgia.....	86.8	80.8	6.0	12 1		80.8
Smithville, North Carolina.....	86.2	78.0	8.2	10 0		78.1
Toledo, Ohio.....	75.7	71.7	4.0	11 11		69.2
Wilmington, North Carolina.....	85.5	80.0	5.5	20 1		75.2

* No observation from 1st to 5th, inclusive.

ATMOSPHERIC ELECTRICITY.

AURORAS.

Auroral displays were observed during the month as follows: On the 1st, from New England westward to Dakota; on the 2d, in the upper lake region; on the 3d, at 9 p. m., at Morris-ton, Dakota; on the 5th, from New England westward to Min-nesota; on the 6th, in Maine; on the 19th, at Wellsboro', Pennsylvania; on the 22d, in Maine and New Hampshire.

The most extended displays were those of the 1st, 5th, and 7th, of which the following reports have been received:

Eastport, Maine, 1st: an aurora was visible at this place from 9 p. m. until the early morning of the 2d.

Mount Washington, New Hampshire, 1st: an aurora was observed at this station at 10.15 p. m.; several distinct auroral beams appearing. The display was obscured by clouds at 11.40 p. m.

Marquette, Michigan, 1st: a faint aurora was seen here from 9 to 9.50 p. m.

Saint Paul, Minnesota, 1st: a pale auroral light was ob-served here from 10.40 to 11.35 p. m.

Eastport, Maine, 5th: faint aurora was visible from 11 p. m. until the early morning of the 6th.

Point Judith, Rhode Island, 5th: a faint aurora, of pale straw color, was observed at 9.35 p. m., which continued until the early morning of the 6th. The auroral light extended from the horizon to an altitude of 20°, and from nnw. to nne.

Gardiner, Maine, 8th: a bright aurora was visible during the evening.

Esacnaba, Michigan, 5th: at 9 p. m. traces of an aurora

were visible in the northwestern sky. Faint beams appeared for a few minutes, which were succeeded by a diffuse yellow light resting upon a dark base. The display ended at about 9.30 p. m.

Mackinaw City, Michigan, 5th: a poorly-defined auroral dis-play was seen from 8.55 p. m. to 11 p. m.

Moorhead, Minnesota, 5th: a faint auroral display was visi-ble here from 10 to 10.20 p. m.

Saint Vincent, Minnesota, 5th: a very faint auroral arch observed at 9.40 p. m.

Portland, Maine, 7th: pale auroral light from 8.30 to 10.30 p. m.

Ithaca, New York, 7th: faint aurora at 9 p. m.

Chincoteague, Virginia, 7th: an aurora was observed at this station from 8 to 9 p. m.

Woodstock, Maryland, 7th: an auroral light appeared sud-denly at 8.35 p. m.; it consisted of numerous unsteady stream-ers, of reddish color, which had a rapid movement westward. By 8.45 p. m. the streamers had faded, leaving a diffuse light, which disappeared between 9 and 10 p. m.

Esacnaba, Michigan, 7th: a faint auroral light, of greenish color, was seen in the north from 9.30 to 10 p. m.

Marquette, Michigan, 7th: faint aurora from 8.55 to 9.55 p. m.

Saint Vincent, Minnesota, 7th: a faint auroral arch was visible at 9.40 p. m.

The s.s. "Sardinian," on the 30th, in about N. 50°, W. 59°, reported a brilliant aurora visible in the northwestern sky.

THUNDER-STORMS.

Thunder-storms were reported in the various districts on the following dates:

New England.—1st, 2d, 3d, 5th, 7th, 10th, 11th, 13th, 18th to 24th, 26th.

Middle Atlantic states.—2d, 3d, 5th, 6th, 10th, 13th, 14th, 15th, 18th to 21st, 23d, 24th, 27th to 31st.

South Atlantic states.—1st to 8th, 10th, 11th, 13th to 18th, 20th to 29th.

Florida peninsula.—1st to 31st.

Eastern Gulf.—1st to 26th, 31st.

Western Gulf.—1st to 10th, 12th to 16th, 20th to 27th.

Tennessee.—1st, 2d, 7th to 11th, 13th, 14th, 15th, 20th to 26th, 28th, 29th.

Ohio valley.—9th, 10th, 12th, 13th, 15th, 19th, 20th, 22d, 23d, 24th, 28th.

Lower lakes.—1st, 2d, 3d, 9th, 10th, 12th, 17th to 20th, 22d, 23d, 28th, 29th.

Upper lakes.—1st, 2d, 11th, 17th to 22d, 27th, 28th, 30th.

Extreme northwest.—3d, 6th, 8th, 9th, 10th, 16th to 19th, 26th, 30th, 31st.

Upper Mississippi valley.—1st, 2d, 3d, 7th to 23d, 27th, 31st.

Missouri valley.—1st, 2d, 3d, 6th to 19th, 22d, 23d, 25th, 26th, 27th, 29th, 31st.

Northern slope.—1st to 14th, 17th, 25th, 28th to 31st.

Middle slope.—1st to 15th, 17th, 22d, 23d, 25th, 26th, 30th.

Southern slope.—1st, 2d, 6th, 9th to 13th, 20th to 24th, 26th.

Southern plateau.—1st to 12th, 14th to 21st, 23d to 29th.

Middle plateau.—1st to 5th, 9th, 10th, 11th, 16th, 25th, 28th to 31st.

Northern plateau.—4th, 5th, 24th, 25th.

Thunder-storms were also reported from the following sta-tions not included in the districts named above: Fort Gaston, California, 31st; Oakwood, California, 28th; Poway, Cali-fornia, 14th; San Diego, California, 27th, 28th; Roseburg, Oregon, 1st; Portland, Oregon, 1st, 2d; Brownsville, Texas, 24th, 27th; Bainbridge Island, Washington Territory, 15th; Fort Townsend, Washington Territory, 3d.

ELECTRICAL PHENOMENA.

The observer on the summit of Pike's Peak, Colorado, re-ported that during a sleet and thunder-storm, on the evening of the 4th, the anemometer cups revolved in circles of electric light. After a flash of lightning the light encircling the cups

became dim, but would soon regain its former brilliancy. The observer states that, by holding up his hands, electric sparks would form on the ends of his fingers, and that his hair and clothing were full of them. A peculiar crackling noise was heard about the anemometer cups; and at the corners of the office building there were continuous sparks of bright light.

Fort Apache, Arizona, 3d.—The anemometer attachments were damaged by atmospheric electricity on this date.

Fort Stockton, Texas.—Telegraphic communication was interrupted by atmospheric electricity at this place on the 1st.

OPTICAL PHENOMENA.

SOLAR HALOS.

Solar halos have been observed in the various districts on the following dates:

New England.—1st, 10th, 12th, 14th, 15th.

Middle Atlantic states.—1st, 8th, 12th to 15th, 18th, 23d, 26th, 27th.

Eastern Gulf.—2d, 14th, 17th, 19th, 27th.

Western Gulf.—5th, 6th, 10th, 13th, 18th, 23d, 26th.

Lower lakes.—1st, 10th, 11th, 15th, 18th, 21st, 23d.

Upper lakes.—8th, 14th, 17th.

Upper Mississippi valley.—3d, 4th, 8th, 9th, 18th, 21st, 23d, 25th.

Solar halos were also reported from the following stations not included in the districts named above:

Oakwood and Poway, California, 7th, 22d; San Francisco, California, 9th, 24th, 26th, 31st; Augusta, Georgia, 13th; Jacksonville, Florida, 24th; Fort Scott, Kansas, 10th; Louisville, Kentucky, 3d; Sunman, Indiana, 8th; Saint Vincent, Minnesota, 28th; Nashville, Tennessee, 31st; DeSoto, Nebraska, 10th, 25th.

LUNAR HALOS.

Lunar halos have been observed in the various districts on the following dates:

Middle Atlantic states.—8th, 12th, 13th, 16th, 18th, 19th, 20th.

South Atlantic states.—13th, 16th to 19th.

Florida peninsula.—9th, 10th, 11th, 16th, 21st.

Eastern Gulf.—16th, 21st, 23d.

Western Gulf.—6th, 10th, 12th to 18th, 21st.

Lower lakes.—12th, 14th, 17th.

Upper lakes.—2d, 11th, 13th, 14th, 19th, 20th.

Upper Mississippi valley.—1st, 11th, 13th, 14th.

Missouri valley.—10th, 17th, 19th.

Lunar halos were also reported from the following stations, not included in the districts named above:

Oakwood, California, 18th; Red Bluff, California, 24th; Fort Grant, Arizona, 9th; Indianapolis, Indiana, 21st; Laconia, Indiana, 14th; Portland and Cornish, Maine, 15th; Boston, Massachusetts, 14th; Knoxville, Tennessee, 22d; Memphis, Tennessee, 15th; Nashville, Tennessee, 10th; Fort Concho, Texas, 10th; Fort Stockton, Texas, 18th.

MIRAGE.

Indianola, Texas, 9th.—During the middle part of the day, the court house and buildings in this city were plainly seen by people in the country, at a distance of from fifteen to sixteen miles. Mirage was also observed on the following dates: 15th, 17th, 18th, 19th, 23d, 31st.

MISCELLANEOUS PHENOMENA.

SUNSETS.

The characteristics of the sky, as indicative of fair or foul weather for the succeeding twenty-four hours, have been observed at all Signal Service stations. Reports from one hundred and forty-five stations show 4,462 observations to have been made, of which nine were reported doubtful; of the remainder, 4,453, there were 3,795, or 85.2 per cent., followed by the expected weather.

SUN SPOTS.

The following record of sun spots for the month of August,

1883, has been forwarded by Professor D. P. Todd, Director of the Lawrence Observatory, Amherst, Massachusetts:

Date— Aug., 1883.	No. of new		Disappeared by solar rotation.		Reappeared by solar rotation.		Total No. visible.		Remarks.
	Gr'ps	Spots	Gr'ps	Spots	Gr'ps	Spots	Gr'ps	Spots	
1, 8 a. m.	0	0	1	25†	0	0	2	25†	Spots probably disappeared by solar rotation. Do.
3, 7 p. m.	0	0	1	20†	0	0	1	2	
4, 8 a. m.	1	4	0	0	1	4	2	6	Spots mostly very small. Do.
5, 10 a. m.	0	0	0	0	0	0	2	6	
6, 7 a. m.	0	0	0	0	0	0	2	5	
7, 8 a. m.	2	6	1	1	1	3	3	10	
8, 8 a. m.	2	20†	0	0	1	10†	4	30†	
9, 6 a. m.	0	0	0	0	0	0	4	20†	
12, 9 a. m.	0	0	0	0	0	0	4	15†	
13, 8 a. m.	0	0	0	0	0	0	3	12†	
14, 2 p. m.	0	0	0	0	0	0	2	7	
15, 7 a. m.	1	2	0	0	1	2	3	9	
17, 8 a. m.	3	7	0	0	3	7	6	13	Spots probably reappeared by solar rotation.
19, 12 m.	0	0	0	0	0	0	5	10	Broad areas of faculae. Do. Do.
20, 8 a. m.	1	2	1	2	1	2	4	8	
21, 11 a. m.	0	2	0	0	0	2	3	9	
22, 3 p. m.	0	0	0	0	0	0	2	6	
24, 12 m.	2	6	0	0	0	0	4	12	
25, 11 a. m.	1	10†	1	1	0	0	4	20†	
26, 9 a. m.	0	20†	0	0	0	0	4	40†	
27, 8 a. m.	1	4	1	4	0	0	4	40†	
28, 8 a. m.	1	20†	0	0	0	0	5	60†	
29, 8 a. m.	1	15†	0	5	1	5	6	70†	
30, 8 a. m.	0	10†	0	0	0	5	6	80†	
31, 10 a. m.	0	10†	0	5	0	5	6	85†	

Faculae were seen at the time of every observation. †Approximated.

Mr. William Dawson, of Spiceland, Indiana, reports having observed sun spots during August, as follows:

4th.—Three groups, eight spots.

6th.—Two groups, seven spots.

7th.—Four groups, fourteen spots.

11th.—Five groups, twenty-three spots.

12th.—Five groups, thirty-three spots, mostly on the eastern hemisphere. A spot of moderate size, with fine penumbra, was observed in the southeastern quadrant.

18th.—Seven groups, twenty-one spots.

20th.—Four groups, seven spots.

22d.—Three groups, forty spots; one long scattering group toward the west side.

24th.—Six groups, thirty spots; one large spot in the southeastern quadrant.

27th.—Five groups, eighty-five spots; one large group in northwest quadrant, and one large spot in the southwest quadrant.

28th.—Five groups, eighty-five spots.

30th.—Six groups, one hundred and fifteen spots; one row of groups south of equator.

Mr. T. C. Hunter, at Wabash, Indiana, reports that a large number of sun spots were observed by him during August, the month closing with fourteen spots of good size still visible on the sun. They were seen on every clear day after the 10th.

Mr. H. D. Govey, at North Lewisburg, Ohio, reports that sun spots were seen on all clear days during the month. They were most numerous on the 31st; least numerous on the 3d; smallest on the 4th, and largest on the 30th and 31st.

METEORS.

Savannah, Perry county, Illinois.—On the 2d, at about 9 p. m., a large meteor passed southward along the "milky way" leaving a brilliant trail, from 30° to 40° in length. A few minutes after midnight of the 11th, four shooting stars were seen within ten minutes. On the 16th a very large meteor was seen in the southeastern sky, which exploded, and was followed by three loud detonations. On the evening of the 27th three meteors were seen within twenty minutes.

Cairo, Illinois.—A bright meteor, of yellowish color, leaving a trail 20° in length, was observed at 9.30 p. m. of the 4th. Another meteor, of similar appearance, was seen at 9.35 p. m., and between 9 and 10 p. m., of the same date, about twenty-five meteors were seen. Numerous meteors were also observed at this station on the evening of the 5th, between 8 and 10 p. m.

New London, Connecticut.—A large number of shooting